

I. INTRODUCTION

Claims 9-16 have been amended above to clarify the subject matter recited therein and address the Examiner's comments, but not for reasons relating to the patentability thereof. Claims 33-36 have been cancelled, without prejudice. Claims 1-8 were previously cancelled, without prejudice. Applicants reserve the right to pursue the subject matter recited in the cancelled claims in the above-identified application and/or in one or more continuation applications claiming priority from the above-identified application.

Accordingly, claims 9-32 and 37-40 are currently under consideration in the above-identified application. Provided above, please find a claim listing indicating the current amendment to claims 9-16, and the status of other claims on separate sheets so as to comply with the requirements set forth in 37 C.F.R. § 1.121. It is respectfully asserted that no new matter has been added. Exemplary support for the amendment to claims 9-16 can be found in the originally-filed application, including the specification, drawings and/or original claims thereof. (See, e.g., Specification, paras. [0033], [0034] and [0050], and Fig. 5).

II. REJECTIONS UNDER 35 U.S.C. § 103(a) SHOULD BE WITHDRAWN

Claims 9-32 and 37-40 stand rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Chao, "Ultimate Strength and Failure Mechanism of Resistance Spot Weld Subjected to Tensile, Shear, or Combined Tensile/Shear Loads", Journal of Engineering Materials and Technology, April 2003, Vol. 125, pp. 125-132 (the "Chao Publication"), in view of Jiang et al., "large Cold Plastic Deformation of Metal

Matrix Composites Reinforced by SiC Particles”, Journal of Materials Science Letters 12, (1993), pp. 1519-1521 (the “Jiang Publication”). (See, e.g., Office Action, p. 2). Claims 33-36 stand rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over the Chao Publication in view of the Jiang Publication and Bai et al., “The Role of the Interfacial strength in glass bead filled HDPE”, Journal of Materials Science Letters 19, (2000), pp. 1587-1589 (the “Bai Publication”). (*Id.*, p. 8).

Applicants respectfully assert that the Chao Publication, taken alone or in alleged combination with Chao Publication and the Bai Publication fails to teach or suggest the subject matter recited in amended independent claims 9-16, and the claims which depend therefrom for at least the reasons as set forth herein below.

“To reject claims in an application under Section 103, an examiner must show an unrebutted *prima facie* case of obviousness.” *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998). The Supreme Court in *Graham v. John Deere*, 383 U.S. 1, 148 USPQ 459 (1966), stated:

Under Section 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined.

Indeed, to sustain a rejection under 35 U.S.C. § 103(a), there must be some teaching, other than the instant application, to alter the prior art to arrive at the claimed invention. “The problem confronted by the inventor must be considered in determining whether it would have been obvious to combine the references in order to solve the problem.” *Diversitech Corp. v. Century Steps, Inc.*, 850 F.2d 675, 679 (Fed. Cir. 1998).

The objective standard for determining obviousness under 35 U.S.C. § 103, as set forth in *Graham v. John Deere, Co.*, 383 U.S. 1 (1966), requires a factual determination to ascertain: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; and (3) the differences between the claimed subject matter and the prior art. Based on these factual inquiries, it must then be determined, as a matter of law, whether or not the claimed subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the alleged invention was made. *Graham*, 383 U.S. at 17. Courts have held that there must be some suggestion, motivation or teaching of the desirability of making the combination claimed by the applicant (the “TSM test”). See *In re Beattie*, 974 F.2d 1309, 1311-12 (Fed. Cir. 1992). This suggestion or motivation may be derived from the prior art itself, including references or disclosures that are known to be of special interest or importance in the field, or from the nature of the problem to be solved. *Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573 (Fed. Cir. 1996).

Although the Supreme Court criticized the Federal Circuit’s application of the TSM test, see *KSR International Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741, (2007) the Court also indicated that the TSM test is not inconsistent with the *Graham* analysis recited in the *Graham v. John Deere* decision. *Id.*; see *In re Translogic Technology, Inc.*, No. 2006-1192, 2007 U.S. App. LEXIS 23969, *21 (October 12, 2007). Further, the Court underscored that “it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.” *KSR*, 127 S. Ct. at 1741. Under the precedent established in *KSR*, however, the presence or absence of a teaching, suggestion, or

motivation to make the claimed invention is merely one factor that may be weighed during the obviousness determination. *Id.* Accordingly, the TSM test should be applied from the perspective of a person of ordinary skill in the art and not the patentee, but that person is creative and not an automaton, constrained by a rigid framework. *Id.* at 1742. However, “the reference[s] must be viewed without the benefit of hindsight afforded to the disclosure.” *In re Paulsen*, 30 F.3d 1475, 1482 (Fed. Cir. 1994).

The prior art cited in an obviousness determination should create a reasonable expectation, but not an absolute prediction, of success in producing the claimed invention. *In re O’Farrell*, 853 F.2d. 894, 903-04 (Fed. Cir. 1988). Both the suggestion and the expectation of success must be in the prior art, not in applicant’s disclosure. *Amgen, Inc. v. Chugai Pharmaceutical Co., Ltd.*, 927 F.2d 1200, 1207 (Fed. Cir. 1991) (citing *In re Dow Chem. Co.*, 837 F.2d 469, 473 (Fed. Cir. 1988)). Further, the implicit and inherent teachings of a prior art reference may be considered under a Section 103 analysis. *See In re Napier*, 55 F.3d 610, 613 (Fed. Cir. 1995).

Secondary considerations such as commercial success, long-felt but unsolved needs, failure of others, and unexpected results, if present, can also be considered. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538-39 (Fed. Cir. 1983). Although these factors can be considered, they do not control the obviousness conclusion. *Newell Cos. v. Kenney Mfg. Co.*, 864 F.2d 757, 768 (Fed. Cir. 1988).

To establish obviousness, the prior art references must be evaluated as a whole for what they fairly teach and neither the references’ general nor specific teachings may be ignored. *Application of Lundsford*, 357 F.2d. 385, 389-90 (CCPA 1966). A reference must be considered for all that it teaches, not just what purportedly

points toward the invention but also that which teaches away from the invention.

Ashland Oil, Inc. v. Delta Resins & Refractories, 776 F.2d. 281, 296 (Fed. Cir. 1985).

Amended independent claim 9 recites, *inter alia*,

a fracture prediction device for use with a spot welded portion, comprising:

a first calculation arrangement configured to **determine a fracture strength parameter of the spot welded portion in at least one of a cross tension or a shear tension based on a stress concentration factor α** and at least one of the inputted material strength, the plate thickness, the nugget diameter of the spot welding, the plate width of the joint, or the rotation angle of the particular joint in the tension testing procedure, wherein **the stress concentration factor α is at least one of (i) defined by a formula of (tensile strength TS)/(mean tensile stress σ_o) or (ii) calculated using a stress concentration factor calculation formula;**

a parameter storage arrangement configured to store the **fracture strength parameter by each steel type;** and

a second calculation arrangement configured to **analyze a fracture of the spot welded portion by providing the fracture strength parameter stored in the parameter storage arrangement into a fracture prediction formula** in which a deformation at a periphery of the spot welding portion is modeled by a finite element procedure,

wherein **the fracture prediction formula is based on a shear force and a vertical force with respect to the spot welded portion.**

Amended independent claims 11, 13 and 15 are directed to a fracture prediction method, a computer storage arrangement and a computer-accessible medium, respectively, and recite similar subject matter as recited in amended independent claim 9.

Amended independent claim 10 recites, *inter alia*,

a fracture prediction device provided for a spot welded portion, comprising:

a first calculation arrangement configured to **determine a fracture strength parameter** in at least one of a cross tension or a shear tension based on **a fracture strength curve of the spot welded portion** obtained from at least one of the material strength, the plate thickness, the nugget diameter of the spot welding, the plate width of the joint, or the rotation angle of the particular joint in the tension testing procedure;

a parameter storage arrangement configured to store the **fracture strength parameter by each steel type**; and

a second calculation arrangement configured to **analyze a fracture of the spot welded portion by providing the fracture strength parameter stored in the parameter storage arrangement into a fracture limit line** in which a deformation at a periphery of the spot welding portion is modeled by a finite element procedure,

wherein **the fracture limit line is created as a curve based on a shear force and a vertical force with respect to the spot welded portion.**

Amended independent claims 12, 14 and 16 are directed to a fracture prediction method, a computer storage arrangement and a computer-accessible medium, respectively, and recite similar subject matter as recited in amended independent claim 10.

In the Office Action, the Examiner admits that the Chao Publication does not teach a fracture limit line. (Office Action, p. 5). Nonetheless, the Examiner then contends that the Jiang Publication purportedly discloses this recitation, and that it would have been allegedly obvious to combine the purported fracture limit line of Jiang with the fracture prediction device of Chao. (*Id.*, pp. 4-5). Applicants respectfully disagree.

As an initial matter, Applicants respectfully assert that the Jiang Publication does not disclose, teach or suggest a fracture prediction formula, as recited

in amended independent claims 9, 11, 13 and 15, or a fracture limit line created as a curve, as recited in amended independent claims 10, 12, 14 and 16, *much less a fracture limit formula or fracture limit line created as a curve based on a shear force and a vertical force*, as explicitly recited in amended independent claims 9-16 (as applicable). Rather, as described in the Jiang Publication, the linear fracture limit line described therein could be drawn in a plane based on the circumferential strain and the local axial strain by linking the fracture points measured on the cylindrical surfaces of specimens. (See, e.g., the Jiang Publication, p. 1519). Clearly, such a fracture limit line is not equivalent to the fracture prediction formula or line created as a curve recited in claims 9-16 (as applicable). Indeed, the line drawn based on measured points described in the Jiang Publication is not a formula or a line created as a curve at all, but instead is merely a best fit line connecting discrete points.

In response to Applicants' argument in the response to the previous Office Action filed with the amendment dated July 6, 2010 (the "Previous Amendment") that the Jiang Publication does not cure the deficiency of the Chao Publication, e.g., a fracture prediction formula based on a shear force and a vertical force, the Examiner asserts in the latest Office Action that the Chao Publication is used for allegedly teaching shear force and vertical force, not the Jiang Publication. (*Id.*, p. 3). However, as discussed herein above and admitted by Examiner in the Office Action, the Chao Publication does not teach a fracture limit line, *much less* a fracture limit or prediction formula or a fracture limit line created as a curve based on a shear force and a vertical force. Accordingly, the Examiner effectively admits that the Chao Publication and the Jiang Publication each fails to teach a fracture limit line based on a shear force and a

vertical force, but nevertheless comes to the conclusion that such recitation would purportedly be obvious in view of the alleged combination of these publications. (*Id.*)

Applicants respectfully assert that this reasoning by the Examiner is flawed. Even if, assuming *arguendo*, the Jiang Publication taught a fracture limit formula and/or line created as a curve, which, Applicants respectfully assert this publication does not for at least the reasons provided herein above, the alleged combination of these publications *still* does not teach or suggest the recited fracture limit or prediction formula or line created as a curve **based on** a shear force and a vertical force. Accordingly, as a fracture limit formula or line created as a curve based on a shear force and a vertical force is not taught by either of these publications, it certainly follows that the alleged combination of these publications also fails to teach or suggest such recited subject matter. Nevertheless, the Examiner asserts that it would purportedly be an obvious extension of the Chao Publication to take the inputs of the normal and shear tests and derive a fracture limit line. (*Id.*) However, the Examiner does not provide any support for this assertion, as required by, e.g., M.P.E.P. 2144.03. Thus, Applicants respectfully request the Examiner to provide such purported support in the next communication.

Further, as described in the specification of the above-identified application, for example, strength data can be obtained by test results and organized with dimensionless expression, such as the relation of the stress concentration factor " α " = (tensile strength "TS") / (mean tensile stress " σ_o ") and a fraction "d/W" of the nugget diameter "d" and the width "W". (See, e.g., Specification, paras. [0031] – [0035]). In fracture prediction calculation, even without any actual tests, a stress

concentration factor for arbitrary spot welding can be determined based on shape data by using this relation as a dimensionless expression, thereby the value of tensile strength of a steel plate to be a fracture limit can be obtained. (*Id.*, paras. [0049] – [0053]). Specifically, this can provide an extension of the scope of prediction for a fracture limit with respect to test models or test conditions having no actual data. (*Id.*)

Accordingly, the fracture limit formula and/or line created as a curve recited in amended independent claims 9-16 (as applicable) of the above-identified application can be used for, e.g., a calculation for infinite combinations of parameters including one in untested scope (e.g., with an applicable range). (*Id.*) This is not possible based on the description of the Chao Publication or the Jiang Publication, taken alone or in alleged combination.

Rather, as described in the Chao Publication and illustrated in Fig. 17 thereof, variation of fracture load based on plate width or variation of fracture load at the same in plate width is unformulated. (See, e.g., the Chao Publication, p. 131). Thus, according to the description of the Chao Publication, fracture prediction for arbitrary spot welding cannot be made unless the database is infinitely expanded for each of various test models and load models. (*Id.*) Indeed, as indicated above, the Examiner admits that the Chao Publication fails to disclose a fracture prediction formula or a fracture limit line, as recited in amended independent claims 9-16 of the above-identified application.

Moreover, as described herein above, the line drawn based on measured points described in the Jiang Publication is not a formula or a line created as a curve at all, but instead is merely a best fit line connecting discrete points. Indeed, the Jiang Publication describes fracture prediction using a *numerical analysis*. (See, e.g., the

Jiang Publication, p. 1519). Accordingly, as described in the remarks filed with the Previous Amendment, when trying to directly calculate local strain (deformation) such as spot welding fracture, it would require a very fine mesh division model, because coarse mesh division would average strain, which results in reducing accuracy. Particularly in full vehicle collision analysis, it is not practical in view of calculating time and costs. Therefore, one having ordinary skill in the art would not have attempted to combine the fracture limit line of the Jiang Publication with the disclosure of the Chao Publication, and indeed would have been taught away from doing so based on the these publications.

Similarly regarding local stress described in the Jiang Publication, an accuracy problem can occur by mesh division. While stress can be converted into load by multiplying by a cross section of a member (e.g., the force balance issue) to partially mitigate this accuracy problem, such may not be practical in actual collision analysis with respect to a spot welded portion based on load values such as vertical force and shear force applied on the spot welded portion being used. Accordingly, for these further reasons, one having ordinary skill in the art would not have attempted to combine the fracture limit line described in the Jiang Publication with the disclosure of the Chao Publication, and indeed would have been taught away from doing so.

Applicants respectfully assert that the Bai Publication fails to cure at least the deficiencies of the Chao Publication and the Jiang Publication described herein above, and the Examiner does not assert that this publication does.

Further, Applicants respectfully assert that the Chao Publication, taken alone or in alleged combination with the Jiang Publication and/or the Bai Publication,

fails to teach or suggest the *determination of a fracture strength parameter of a spot welded portion in a cross tension and/or a shear tension based on a stress concentration factor α that is defined by a formula of (tensile strength TS)/(mean tensile stress σ_o) and/or calculated using a stress concentration factor calculation formula*, as also recited in amended independent claims 9, 11, 13 and 15. Indeed, the Examiner admits in the Office Action with respect to the rejection of now-cancelled claims 33-36 that such subject matter (which is now recited in amended independent claims 9, 11, 13 and 15) is not taught by the alleged combination of the Chao Publication and the Jiang Publication, but contends that the Bai Publication allegedly teaches this recitation. (See Office Action, p. 8).

However, the Bai Publication relates to the role of the interfacial strength in glass bead filled high density polyethylene ("HDPE"), and the stresses at which interfacial debonding occurs. (See, e.g., the Bai Publication, pp. 1587-88). The Bai publication does not relate to spot welding at all, *much less* teach or suggest the *determination of a fracture strength parameter of a spot welded portion in a cross tension and/or a shear tension based on a stress concentration factor α that is defined by a formula of (tensile strength TS)/(mean tensile stress σ_o) and/or calculated using a stress concentration factor calculation formula*, as explicitly recited in amended independent claims 9, 11, 13 and 15. Indeed, the Bai Publication relates to a very different problem (e.g., stresses at which interfacial debonding occurs in HDPEs) than the Chao Publication and the Jiang Publication. Further, Applicants respectfully assert that the Bai Publication actually teaches away from the Chao Publication and the Jiang

Publication, at least because the Bai Publication is specific to HDPE which have very different properties than spot welded materials.

Therefore, for at least the reasons provided herein above, Applicants respectfully assert that the rejection of amended independent claims 9-16, and claims 17-32 and 37-40 which depend therefrom, as applicable, under 35 U.S.C. § 103(a) as allegedly being unpatentable over the Chao Publication in view of the Jiang Publication, should be withdrawn.

III. CONCLUSION

In light of the foregoing, Applicants respectfully submit that claims 9-32 and 37-40 are in condition for allowance. Prompt consideration, reconsideration and allowance of the present application are therefore earnestly solicited. If any issues remain outstanding, the Examiner is invited to contact the undersigned via the telephone number provided below.

Respectfully submitted,

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By: 

Gary Abelev
Patent Office Reg. No. 40,479

Randall M. Berman
Patent Office Reg. No. 61,609

DORSEY & WHITNEY, L.L.P.
250 Park Avenue
New York, New York 10177

Attorney(s) for Applicant(s)
(212) 415-9371